

SKULL

SKULL PLANES, POINTS & LINE

- Midsagittal plane (MSP)
- Interpupillary line (IPL)
- Acanthion
- Outer canthus
- Infraorbital margin
- External acoustic meatus (EAM)
- Orbitalmeatal line (OML)
- Infraorbitomeatal line (IOML)/Frankfurt Line
- Acanthiomeatal line (AML)
- Mentomeatal line (MML)
- Between OML & IOML: 7° difference
- Between OML & GML: 8° difference

PATHOLOGY

1.) Basal Fx

- Fx located at the base of the skull

2) Blowout Fx

- Fx of the floor of the orbit

3.) Contre-Coup Fx

- Fx to one side of a structure caused by trauma to the other side

4.) Depressed Fx

- Fx causing a portion of the skull to be depressed into the cranial cavity

5.) Le Fort Fx

- Bilateral horizontal fxs of the maxillae

6.) Linear Fx

- Irregular or jagged fx of the skull

7.) Tripod Fx

- Fx of the zygomatic arch & orbital floor/rim & dislocation of the frontozygomatic suture

8.) Mastoiditis

- Inflammation of mastoid antrum & air cells

9.) Paget's Disease

- Thick, soft bone marked by bowing fxs

10.) Sinusitis

- Inflammation of one or more of the paranasal sinuses

11.) TMJ Syndrome

- Dysfunction of the temporomandibular joint

A.) SKULL

PA PROJECTION

PP: Prone; forehead & nose against IR; MSP & OML perpendicular to IR

RP: Nasion

CR: Perpendicular

SS: Petrous pyramid completely filled the orbits; frontal bone

AP PROJECTION

PP: Supine; MSP & OML perpendicular to IR

RP: Nasion

CR: Perpendicular

SS: Same as PA, but the image is MAGNIFIED

MODIFIED CALDWELL METHOD

PA AXIAL PROJECTION

PP: Prone; forehead & nose against IR; OML perpendicular to IR; MSP perpendicular to IR

RP: Nasion

CR: 15° caudad

SS:

-General Survey Examination:

- Anterior & side walls of the cranium
- Temporal fossae
- Frontal sinuses & anterior ethmoid sinus
- Crista galli
- Upper 2/3 of orbits
- Petrous pyramid to lower 1/3 of orbit

-Superior orbital fissure/sphenoid fissure (20-25° caudad) & foramen rotundum (25-30° caudad)

AP AXIAL PROJECTION

PP: Supine; OML perpendicular to IR

RP: Nasion

CR: 15° cephalad

SKULL

SS: Same as PA axial but orbits are magnified & the distance b/n lateral margin of orbits & temporal bones are less on AP than PA

TRUE/ORIGINAL CALDWELL

PP: Prone; forehead & nose against IR; GML perpendicular to IR; MSP perpendicular to IR

RP: Nasion

CR: 23° caudad

SS: Same as above

LATERAL PROJECTION

PP: Semiprone; MSP & IOML parallel to IR; IPL perpendicular to IR

RP: 2 in. Above EAM or midway b/n inion & glabella

CR: Perpendicular

SS:

-General survey examination

- Sella turcica
- Anterior & posterior clinoid processes,
- Dorsum sellae
- Superimposed mandibular rami
- Mastoid region
- EAM & TMJ

CROSSTABLE LATERAL

PP: Dorsal decubitus (Robinson, Meares & Goree recommendation); MSP perpendicular to IR

RP: 2 in. Above EAM

CR: Horizontal

ER: For traumatic sphenoid sinus effusion (basal skull fx)

TOWNE/ALTSCHUL/GRASHEY/CHAMBER

LAINE METHOD

AP AXIAL PROJECTION

PP: Supine; OML/IOML & MSP perpendicular to IR;

RP: 2.5-3 in. above glabella

CR: 30° caudad (OML \perp); 37° caudad (IOML \perp)

SS:

-“SPDOP”

- Symmetric petrous pyramid
- Posterior portion of foramen magnum
- Dorsum sellae & posterior clinoid process w/in shadow of foramen magnum
- Occipital bone
- Posterior portion of parietal bone

-Tomographic studies of ears, facial canal, jugular foramina & rotundum foramina

-Entire foramen magnum jugular foramina (40-60° caudad to OML)

-Posterior portion of cranial vault (CR \perp to midway b/n frontal tuberosities)

TOWNE/ALTSCHUL/GRASHEY/CHAMBER

LAINE METHOD

AP AXIAL PROJECTION

PP: Lateral decubitus; OML/IOML & MSP perpendicular to IR

RP: 2.5-3 in. above glabella

CR: 30° caudad (OML \perp); 37° caudad (IOML \perp)

SS: Same as above

ER: For patient w/ pathologic condition, trauma or deformity (strongly accentuated dorsal kyphosis)

HAAS METHOD

PA AXIAL PROJECTION

PP: Prone; MSP & OML perpendicular to IR; forehead & nose against the table; IR center 1 in. to nasion

RP: 1.5 in. below inion (entrance); 1.5 in. superior to nasion (exit)

CR: 25° cephalad to OML

SS:

- Occipital bone
- Symmetric petrous pyramid
- Dorsum sellae & posterior clinoid processes w/in shadow of foramen magnum

ER: For obtaining image of sellar structures (DS & PCP) w/in FM on hypersthenic & obese patient

SKULL

SCHULLER/PFEIFFER METHOD

SUBMENTOVERTICAL PROJECTION

PP: Supine or Seated-upright (more comfortable); IOML parallel to IR; MSP perpendicular to IR; head rested on vertex; neck hyperextended

RP: ¾ in. anterior to EAM (sella turcica)

CR: Perpendicular to IOML; MSP of throat b/n gonion (entrance)

SS: Cranial base

- Foramen ovale & spinosum (best demonstrated)
- Symmetric petrosae
- Mastoid processes
- Carotid canals
- Sphenoidal & ethmoidal sinuses
- Mandible
- Bony nasal septum
- Dens of axis
- Occipital bone
- Maxillary sinus superimposed over the mandible
- Zygomatic arches (well demonstrated if exposure factors are decreased)
- Axial tomography of orbits, optic canals, ethmoid bone, maxillary sinuses & mastoid processes

SCHULLER METHOD

VERTICOSUBMENTAL PROJECTION

PP: Prone; chin fully hyperextended; MSP perpendicular to IR

RP: ¾ in. anterior to EAM (sella turcica)

CR: Perpendicular to IOML; MSP of throat b/n gonion (entrance)

SS: Same as SMV

- Distorted & magnified basal structures
- Useful for anterior cranial base & sphenoidal sinuses
 - IR in contact with the throat
 - Reduces magnification & distortion

LYSHOLM METHOD

AXIOLATERAL METHOD

PP: Semiprone; MSP parallel to IR; IOML parallel to transverse axis of IR; IPL perpendicular to IR

RP: 1 in. distal to lower EAM (exit)

CR: 30-35° caudad

SS: Oblique position of lateral aspect of cranial base closest to IR

ER: For patients who cannot extend their head enough for a satisfactory SMV projection

VALDINI METHOD

PA AXIAL PROJECTION

PP: Recumbent or seated-erect (more comfortable); upper frontal region of skull against IR; MSP perpendicular to IR; head acutely flexed; IOML 50°/OML 50°; line extending frominion to 0.5 cm distal to nasion form 28° to CR

RP: 0.5 cm distal to nasion (dorsum sellae); foramen magnum/slightly above level of EAM (petrosae)

CR: Perpendicular; inion (entrance); 0.5 cm distal to nasion (exit)

SS:

- DILA (IOML 50°): **D**orsum sellae; **I**nternal Auditory Meatus (IAM); **L**abyrinth
- ETB “EaT Bulaga” (OML 50°): **E**xternal auditory meatus; **T**ympanic cavity; **B**ony part of Eustachian tube
- Dorsum sellae & posterior clinoid processes within or above shadow of foramen magnum
- Tuberculum sellae, anterior clinoid processes & sella turcica below shadow of foramen magnum
- Mastoid pneumatization

B.) SELLA TURCICA

LATERAL PROJECTION

PP: Semiprone; MSP & IOML parallel to IR; IPL perpendicular to IR

SKULL

RP: ¾ in. anterior & ¾ in. superior to EAM

CR: Perpendicular

SS: Superimposed anterior & posterior clinoid processes; dorsum sellae

TOWNE METHOD

PP: Supine; OML/IOML & MSP perpendicular to IR;

RP: 2.5-3 in. above glabella

CR: 30° caudad (OML ⊥); 37° caudad (IOML ⊥)

SS: Sellar region

- Dorsum sellae, tuberculum sellae & anterior clinoid processes through occipital bone above shadow of foramen magnum (30° caudad)
- Dorsum sellae & posterior clinoid processes w/in shadow of foramen magnum (37° caudad)
- Symmetric petrous pyramid

HAAS METHOD

PA AXIAL PROJECTION

PP: Prone; MSP & OML perpendicular to IR; forehead & nose against the table; IR center 1 in. to nasion

RP: 1.5 in. below inion (entrance); 1.5 in. superior to nasion (exit)

CR: 25° cephalad to OML

SS:

- Dorsum sellae & posterior clinoid processes w/in shadow of foramen magnum
- Symmetric petrous pyramid

ER: For obtaining image of sellar structures (DS & PCP) w/in FM on hypersthenic & obese patients

PA PROJECTION

PP: Prone; forehead & nose against IR; MSP & OML perpendicular to IR

RP: Glabella

CR: 10° cephalad

SS: Dorsum sellae, tuberculum sellae, anterior & posterior clinoid processes through frontal bone above ethmoidal sinuses

C.) OPTIC CANAL/FORAMEN

RHESE METHOD

PARIETO-ORBITAL OBLIQUE PROJECTION

PP: Prone; affected orbit closest to IR; zygoma, nose & chin against IR (3-pt Lower Landing); AML perpendicular to IR; MSP 53° angle to IR

RP: Affected orbit closest to IR

CR: Perpendicular

SS: Optic canal/foramen (inferior & lateral quadrant of orbital shadow)

- PAZAM: Prone; Affected orbit against IR; Zynoch; AML ⊥; MSP 53° to IR

RHESE METHOD

ORBITO-PARIETAL OBLIQUE PROJECTION

PP: Supine; affected orbit away from IR; AML perpendicular to IR; MSP 53° angle to IR

RP: Inferior and lateral margin of uppermost orbit

CR: Perpendicular

SS: Magnified optic canal/foramen

- Increased radiation dose to lens of eye

ALEXANDER METHOD

ORBITO-PARIETAL OBLIQUE PROJECTION

PP: Erect/supine; IR 15° angle from vertical; MSP 40° to IR; AML perpendicular to IR

RP: Inferior and lateral margin of uppermost orbit

CR: Perpendicular

SS: Optic canal/foramen

SKULL

MODIFIED LYSHOLM METHOD ECCENTRIC ANGLE PARIETO-ORBITAL OBLIQUE PROJECTION

PP: Prone; forehead & nose against IR; IOML perpendicular to IR; MSP 20° from vertical;

RP: Affected orbit (exit)

CR: 20° caudad or 30° caudad

SS: Optic canal/foramen & anterior clinoid processes (20°); superior orbital fissure (30°)

D.) SPHENOID STRUT

-the inferior root of lesser wing of sphenoid bone-

HOUGH METHOD PARIETO-ORBITAL OBLIQUE PROJECTION

PP: Prone; superciliary ridge/arch & side of the nose against IR; IOML perpendicular to IR; MSP 20° from vertical; MSP 20° toward the side of interest

RP: Affected orbit (exit)

CR: 7° caudad

SS: Unobstructed & undistorted image of the sphenoid strut (lie b/n sphenoidal sinus & combined shadows of anterior clinoid processes & lesser wing of sphenoid bone)

E.) SUPERIOR ORBITAL/SPHENOID FISSURES

CALDWELL METHOD PA AXIAL PROJECTION

PP: Prone; forehead & nose against IR; OML perpendicular to IR

RP: Nasion

CR: 20-25° caudad or 15° caudad

SS: Superior orbital fissures

- Lying on the medial side of orbits b/n greater & lesser wings of sphenoid)

- Well demonstrated at 15° caudal angle (Caldwell)
- Petrous portions at or below the inferior orbital margin

F.) INFERIOR ORBITAL FISSURES

BERTEL METHOD PA AXIAL PROJECTION

PP: Prone; forehead & nose against IR; IOML perpendicular to IR

RP: Nasion

CR: 20-25° cephalad

SS: Inferior orbital fissures

- b/n shadows of pterygoid process of sphenoid bone & mandibular ramus
- Anterior image of each orbital floor

G.) EYE- FOREIGN BODY LOCALIZATION

LATERAL PROJECTION

PP: Semiprone; MSP parallel to IR; IPL perpendicular to IR; instruct patient to look straight ahead during exposure

RP: Outer canthus

CR: Perpendicular

SS: Superimposed orbital roofs

PA AXIAL PROJECTION

PP: Prone; forehead & nose against IR; MSP & OML perpendicular to IR; instruct patient to close the eyes

RP: Midorbis

CR: 30° caudad

SS: Petrous pyramids lying below orbital shadows

MODIFIED WATERS METHOD PARIETOACANTHIAL PROJECTION

PP: Prone; chin against IR; MSP perpendicular to IR; OML 50° to IR (new); OML 25-37° to IR (old); instruct patient to close the eyes

SKULL

RP: Midorbits

CR: Perpendicular

SS: Petrous pyramids lying well below orbital shadows

- CR perpendicular
- CR 15-25° cephalad

VOGT-BONE-FREE POSITION

- Taken to detect small or low density foreign particles located in the anterior segment of the eyeball/eyelids
- **2 Projections:** lateral & superoinferior
- **2 Movements:**
 - Vertical: 2 exposures (for lateral)
 - Look up as far as possible
 - Look down as far as possible
 - Horizontal: 2 exposures (for superoinferior)
 - Look to extreme right
 - Look to extreme left

PARALLAX METHOD

- First described by Richards
- It determines whether the foreign body is located within the eyeball requires no special apparatus
- Not considered as precision localization procedure
- Widely used as preliminary check only
- **2 Projections:**
 - Lateral: 2 exposures
 - PA: 2 exposures

SWEET METHOD

- It determines the exact location of a foreign body by use of a geometric calculations
- **Apparatus:**
 - Sweet localizing device
 - Sweet film pedestal
- **1 Projection:**
 - Lateral: 2 exposures

PFEIFFER-COMBERG METHOD

- A leaded contact lens is placed directly over the cornea
- **Apparatus:**
 - Contact lens localization device
 - Pedestal type of film holder
- **2 Projections:**
 - Waters Method:
 - CR horizontal
 - Lateral:
 - CR perpendicular

H.) FACIAL BONE

LATERAL PROJECTION

PP: Semiprone; MSP & IOML parallel to IR; IPL perpendicular to IR

RP: Zygoma/malar bone

CR: Perpendicular

SS: Superimposed facial bones

- Superimposed mandibular rami & orbital roofs

WATERS METHOD

PARIETO-ACANTHIAL PROJECTION

PP: Prone; MSP & MML perpendicular to IR; OML 37° to IR; nose ¾ in. (1.9 cm) away from IR

RP: Acanthion (exit)

CR: Perpendicular

SS: Orbits, maxillae & zygomatic arches

- Best projection for facial bones
- Petrous ridges below the maxillae
- Blow out fractures

MODIFIED WATERS

PP: Prone; MSP & MML perpendicular to IR; OML 55° to IR

RP: Acanthion (exit)

SKULL

CR: Perpendicular

SS: Facial bones w/ less axial angulation

- Petrous ridges below the inferior border of orbits

REVERSE WATERS METHOD

AP AXIAL PROJECTION

PP: Supine; MSP & MML perpendicular to IR; OML 37° to IR; chin up

RP: Acanthion (exit)

CR: Perpendicular

SS: Superior facial bones; same as True/Original Waters, but the image is MAGNIFIED

ER: For patient who cannot be placed in the prone position

CALDWELL METHOD

PA AXIAL PROJECTION

PP: Prone; forehead & nose against IR; OML perpendicular to IR

RP: Nasion

CR: 15° caudad or 30° caudad (Exaggerated Caldwell)

SS: Orbital rims, maxillae, nasal septum, zygomatic bones & anterior nasal spine

- Petrous ridges at lower third of orbits (15° caudad)
- Petrous ridges below the inferior orbital margins (30° caudad)
- Orbital floors (30° caudad)

LAW METHOD

PA OBLIQUE AXIAL PROJECTION

PP: Semiprone; zygoma, nose & chin against IR; unaffected side against IR; OML perpendicular to IR; Center IR 2 in. above floor of maxillary sinuses

RP: Lower antrum

CR: 25-30° cephalad; posterior to gonion (entrance)

SS: Floor & posterior wall of maxillary sinus (antrum) of side down

- External orbital wall

- Zygomatic bone

- Anterior wall of maxillary sinus of side up

I.) NASAL BONE

LATERAL PROJECTION

PP: Semiprone; MSP & IOML parallel to IR; IPL perpendicular to IR

RP: ¾ in. (old) or ½ in. (new) distal to nasion

CR: Perpendicular

SS: Nasal bones of side down & soft tissue structures

TANGENTIAL PROJECTION

PP:

- Extraoral Film (Cassette): prone; chin rested on sandbags; chin fully extended; MSP & GAL perpendicular to IR
- Intraoral Film (Occlusal Film): supine; head elevated; MSP perpendicular to sponge; GAL parallel to sponge & perpendicular to film

RP: Glabellaloalveolar line

CR: Perpendicular

SS: Nasal bones with minimal superimposition

ER: For demonstration of any medial or lateral displacement of fragments in fractures

Contraindications:

- Children or adults who have very short nasal bones, concave face or protruding upper teeth

WATERS METHOD

PARIETO-ACANTHIAL PROJECTION

PP: Prone; MSP & MML perpendicular to IR; OML 37° to IR; nose ¾ in. (1.9 cm) away from IR

RP: Acanthion (exit)

CR: Perpendicular

ER: Displacement of bony nasal septum & depressed fx of nasal wings

SKULL

J.) ZYGOMATIC ARCHES

SCHULLER/PFEIFFER METHOD

SUBMENTOVERTICAL PROJECTION

PP: Supine or Seated-upright (more comfortable);
IOML parallel to IR; MSP perpendicular to IR;
head rested on vertex; neck hyperextended

RP: 1 in. posterior to outer canthi

CR: Perpendicular to IOML; MSP of throat b/n
gonion (entrance)

SS: Best demonstrates bilateral symmetric
zygomatic arches

MODIFIED TITTERINGTON METHOD

PA AXIAL (SUPERIOINFERIOR) PROJECTION

PP: Prone; nose & chin against IR; MSP
perpendicular to IR

RP: Vertex midway b/n zygomatic arches

CR: 23-38° caudad

SS: Well shown zygomatic arches

MAY METHOD

TANGENTIAL PROJECTION

PP: Prone/seated; neck fully extended; IOML
parallel to IR; MSP rotated 15° toward the side of
interest; head tilted 15°

RP: Zygomatic arch at 1.5 in. posterior to outer
canthus

CR: Perpendicular to IOML

SS: Zygomatic arch free of superimposition

ER: Useful with patients who have depressed
fractures or flat cheekbones

MODIFIED TOWNE METHOD

AP AXIAL PROJECTION

JUG HANDLE VIEW

PP: Supine; OML/IOML & MSP perpendicular to
IR;

RP: Glabella (1 in. above nasion)

CR: 30° caudad (OML \perp); 37° caudad (IOML \perp)

SS: Bilateral symmetric zygomatic arches free of
superimposition

K.) MANDIBLE

PA PROJECTION

PP: Prone; forehead & nose against IR; OML &
MSP perpendicular to IR

RP: Acanthion (exit)

CR: Perpendicular

SS: Mandibular rami

ER: To demonstrate any medial or lateral
displacement of fragments in fractures of the rami

PA AXIAL PROJECTION

PP: Prone; forehead & nose against IR; OML &
MSP perpendicular to IR

RP: Acanthion (exit)

CR: 20 or 25° cephalad

SS: Condylar processes; mandibular rami

ER: To demonstrate any medial or lateral
displacement of fragments in fractures of the rami

PA PROJECTION

PP: Prone; nose & chin against IR; AML & MSP
perpendicular to IR

RP: Level of lips

CR: Perpendicular

SS: Mandibular body

PA AXIAL PROJECTION

PP: Prone; nose & chin against IR; AML & MSP
perpendicular to IR; fill the mouth with air to
obtained better contrast around TMJs (Zanelli
recommendation)

RP: Midway b/n TMJs

CR: 30° cephalad

SS: Mandibular body; TMJs; condylar processes

SKULL

AXIOLATERAL OBLIQUE PROJECTION

PP: Seated/semiprone/semisupine; head in true lateral & IPL perpendicular to IR (ramus); head rotated 30° toward IR (body); head rotated 45° toward IR (symphysis); head rotated 10-15° toward IR (general survey); mouth closed; neck extended (prevent superimposition of cervical spine)

RP: Mandibular region of interest

CR: 25° cephalad

SS: Mandibular body & TMJs

ER: To place the desired portion of the mandible parallel with the IR

Muscular/Hypersthenic Patients: MSP 15° & CR 10° cephalad

- To reduce the possibility of projecting shoulder over the mandible

SCHULLER/PFEIFFER METHOD SUBMENTOVERTICAL PROJECTION

PP: Supine or Seated-upright (more comfortable); IOML parallel to IR; MSP perpendicular to IR; head rested on vertex; neck hyperextended

RP: Midway b/n gonions

CR: Perpendicular to IOML

SS: Mandibular body; coronoid & condyloid processes of rami

SCHULLER METHOD VERTICOSUBMENTAL PROJECTION

PP: Prone; chin fully hyperextended; IR against throat; MSP perpendicular to IR

RP: Level just posterior to outer canthi

CR: Perpendicular to IOML or occlusal plane

SS: Condyle & neck of condylar processes are better shown (CR ⊥ occlusal plane)

PANORAMIC TOMOGRAPHY/ PANTOMOGRAPHY/ROTATIONAL TOMOGRAPHY

-technique employed to produced tomograms of curved surfaces-

- Provides panoramic image of the entire mandible, TMJ, dental arches
- Provides distortion-free lateral image of the entire mandible
- Patients who sustained severe mandibular or TMJ trauma
- Useful for general survey studies of dental abnormalities
- Adjuvant for pre-bone marrow transplant

L.) TEMPOROMANDIBULAR JOINTS

TOWNE METHOD AP AXIAL PROJECTION

PP: Supine; MSP & OML perpendicular to IR

- **Closed-mouth Position:** posterior teeth in contact not incisors
 - **Rationale:** prevents mandibular protrusion & condyles to be carried out of mandibular fossae
- **Opened-mouth Position:** open as wide as possible
 - Mandible not protruded (jutting forward)
 - Not perform in trauma patients

RP: 3 in. above nasion

CR: 35° caudad

SS: Mandibular condyles & mandibular fossae of temporal bones

- Closed-mouth: condyle lying in mandibular fossa
- Opened-mouth: condyles lying inferior to articular tubercle

SKULL

AXIOLATERAL PROJECTION

PP: Semiprone; head in lateral position; IPL perpendicular to IR; MSP parallel to IR; closed-mouth & opened-mouth position

RP: 0.5 in. anterior & 2 in. superior to upside EAM

CR: 25-30° caudad

SS: TMJ anterior to EAM

- Closed-mouth: condyle lying in mandibular fossa
- Opened-mouth: condyles lying inferior to articular tubercle

SCHULLER METHOD

AXIOLATERAL OBLIQUE/LATERAL TRANSCRANIAL/AXIAL TRANSCRANIAL PROJECTION

PP: Semiprone; MSP rotated 15° toward the IR; AML parallel to transverse axis of IR;

RP: 1.5 in. superior to upside EAM

CR: 15° caudad; TMJ of sidedown (exit)

SS: Condyles & neck of the mandible

- Closed-mouth: fracture of the neck & condyle of ramus
- Opened-mouth: mandibular fossa; inferior & anterior excursion of the condyle

INFEROSUPERIOR TRANSFACIAL POSITION

PP: Semiprone; head in true lateral; IPL 10-15° from perpendicular; MSP 15° from IR

RP: Uppermost gonion

CR: 30° cephalad

SS: TMJ

ALBERS-SCHONBERG METHOD

LATERAL TRANSFACIAL POSITION

PP: Semiprone; head in true lateral; IPL perpendicular to IR; MSP parallel to IR; IOML parallel to transverse axis of IR

RP: TMJ closes to IR (exit)

CR: 20° cephalad

SS: TMJ

ZANELLI METHOD

LATERAL TRANSFACIAL POSITION

PP: Lateral recumbent; head in true lateral; head resting on parietal region; MSP 30° to IR

RP: Uppermost gonion (entrance)

CR: Perpendicular

SS: TMJ

M.) SINUSES

Cross & Flecker: pointed out the value of erect position

- To demonstrate presence or absence of fluid
- To differentiate between shadows caused by fluid & those caused by pathology

LATERAL PROJECTION

PP: Upright RAO/LAO or dorsal decubitus (can't assume upright); head in true lateral; MSP parallel to IR; IPL perpendicular to IR; IOML parallel to transverse axis of IR;

RP: 0.5-1 in. posterior to outer canthus

CR: Perpendicular

SS: All paranasal sinuses

PA PROJECTION

PP: Upright; forehead & nose against IR; MSP & OML perpendicular to IR

RP: Nasion (\perp); glabella (10° cephalad); midregion of maxillary sinuses (\perp)

CR: Perpendicular; 10° cephalad; perpendicular

SS:

- Posterior ethmoid sinuses inferior to cranial bones & superior to anterior ethmoid sinuses (\perp)
- Sphenoidal sinuses through frontal bone & superior to frontal & ethmoid sinuses
- Maxillary sinuses inferior to cranial base

SKULL

CALDWELL METHOD PA AXIAL PROJECTION

PP: Upright

- **Angle grid technique:** nose & forehead against IR; IR tilted 15°; MSP & OML perpendicular to IR
- **Vertical grip technique:** nose against IR; OML 15° from IR; sponge b/n forehead & IR; MSP perpendicular to IR

RP: Nasion

CR: Horizontal

SS: Frontal sinuses & anterior ethmoidal sinuses

WATERS METHOD PARIETOACANTHIAL PROJECTION

PP: Upright; neck hyperextended & rested against IR; OML 37° to IR; MML perpendicular to IR

RP: Acanthion

CR: Horizontal

SS: Maxillary sinuses

- Petrous pyramids inferior to floor of maxillary sinus
- Foramen rotundum
- Distorted frontal & ethmoidal sinuses

OPEN-MOUTH WATERS METHOD PARIETOACANTHIAL PROJECTION

PP: Upright; neck hyperextended & rested against IR; OML 37° to IR; MML perpendicular to IR; mouth wide open

RP: Acanthion

CR: Horizontal

SS: Sphenoidal sinuses projected through open mouth

- Petrous pyramids inferior to floor of maxillary sinus

ER: For the patients who cannot be placed in position for SMV

SCHULLER METHOD SUBMENTOVERTICAL PROJECTION

PP: Upright; IOML parallel to IR; MSP perpendicular to IR; head rested on vertex; neck hyperextended

RP: ¾ in. anterior to EAM (sella turcica)

CR: Perpendicular to IOML; MSP of throat b/n gonion (entrance)

SS: Sphenoidal & ethmoidal sinuses

- Anterior portion of the base of the skull

SCHULLER METHOD VERTICOSUBMENTAL PROJECTION

PP: Seated-erect; chin fully hyperextended; MSP perpendicular to IR

RP: ¾ in. anterior to EAM (sella turcica)

CR: Perpendicular to IOML; MSP of throat b/n gonion (entrance)

SS: Sphenoidal sinuses

- Posterior ethmoidal sinuses
- Maxillary sinuses
- Nasal fossae

PIRIE METHOD AXIAL TRANSORAL POSITION

PP: Upright (prone; nose & chin against IR; mouth wide open; MSP perpendicular to IR; phonate “ah” during exposure

RP: ¾ in. anterior to EAM (sella turcica)

CR: Perpendicular

SS: Sphenoidal sinuses projected through open mouth

- Maxillary sinuses
- Nasal fossae

RHESE METHOD PA OBLIQUE POSITION

PP: Seated-erect; zygoma, nose & chin against IR; AML perpendicular to IR; MSP 53° from IR

RP: Upper parietal region

CR: Perpendicular

SKULL

SS: Oblique image of posterior & anterior ethmoidal sinuses

- Frontal & sphenoidal sinuses
- Profile image of the optic canal

LAW METHOD

PA OBLIQUE POSITION

PP: Seated-erect; zygoma, nose & chin against IR; neck fully extended

RP: Uppermost gonion

CR: 25-30° cephalad

SS: Relationship of teeth to maxillary sinuses

N.) MASTOID

LAW METHOD

AXIOLATERAL POSITION

Double Angulation Method

PP: Prone; head in true lateral; tape auricle forward; MSP & IOML parallel to IR; IPL perpendicular to IR

RP: 2 in. posterior & 2 in. superior to uppermost EAM

CR: 15° caudad & 15° anterior

Lange Recommendations:

- 25° caudad & 20° anterior
- Auricles taped forward

Single Angulation Method

PP: Prone; tape auricle forward; MSP rotated 15° toward IR

RP: 2 in. posterior & 2 in. superior to uppermost EAM

CR: 15° caudad

Part Angulation Method

PP: Prone; head rested on flat surface of cheek; tape auricle forward; MSP rotated 15° towards IR; IPL 15° from vertical

RP: 2 in. posterior & 2 in. superior to uppermost EAM

CR: ⊥

SS: Mastoid cells

- Sigmoid sinus
- Lateral portion of pars petrosa
- Tegmen tymphani
- Superimposed internal & external auditory meatuses
- Mastoid emissary vessel (when present)

MODIFIED HICKEY METHOD

AP TANGENTIAL POSITION

PP: Supine; tape auricles forward; face rotated away from side of interest; MSP 55° from IR or 35° from vertical; IOML perpendicular to IR; IR caudally inclined 15°

RP: 1 in. superior to tip of mastoid process

CR: 15° caudad

SS: Mastoid process free of superimposition

- Projected below the shadow of occipital bone

PA TANGENTIAL POSITION

PP: Prone; IR cranially inclined 15°; tape auricles forward; cheek against IR; face rotated away from side of interest; MSP 55° from IR or 35° from vertical; IOML perpendicular to IR

RP: 1 in. superior to tip of mastoid process

CR: 15° cephalad

SS: Mastoid process free of superimposition

- Projected below the shadow of occipital bone

TOWNE METHOD

AP AXIAL PROJECTION

PP: Supine; OML/IOML & MSP perpendicular to IR;

RP: 2 in. above glabella or 2.5 in. above nasion

CR: 30° caudad (OML ⊥); 37° caudad (IOML ⊥)

SS:

- Internal auditory canals
- Petrous portion of temporal bone
- Labyrinths

SKULL

- Mastoid antrum
- Middle ears
- Dorsum sellae w/in foramen magnum

HENSCHEN, SCHULLER, & LYSHOLM METHODS

AXIOLATERAL POSITIONS

PP: Semiprone; head in true lateral; MSP parallel to IR; IPL perpendicular to IR; IOML parallel to transverse axis of IR; auricles taped forward

RP: Dependent EAM closest to IR

CR: 15° caudad (Henschen/Cushing); 25° caudad (Schuller); 35° caudad (Lysholm/Runstrom II)

SS: Mastoid & petrous portion

- Mastoid cells, mastoid antrum, IAM & EAM & tegmen tympani (Henschen)
- Tumors of the acoustic nerve (Cushing)
- Pneumatic structures of mastoid process, mastoid antrum, tegmen tympani, IAM & EAM, sinus & dural plates & mastoid emissary when present (Schuller)
- Mastoid cells, mastoid antrum, IAM & EAM, tegmen tympani, labyrinthine area & carotid canal (Lysholm/Runstrom II)

Runstrom Recommendation:

- Exposure made with open mouth
- For visualization of petrous apex between anterior wall of EAM & mandibular condyle

O.) PETROUS PORTION

TOWNE METHOD

AP AXIAL PROJECTION

PP: Supine; OML/IOML & MSP perpendicular to IR;

RP: MSP b/n EAMs

CR: 30° caudad (OML \perp); 37° caudad (IOML \perp)

SS: Petrosae above base of the skull

- IAM
- Arcuate eminences

- Labyrinths
- Mastoid antrum
- Middle ears
- Dorsum sellae w/in shadow of foramen magnum

HAAS METHOD

PA AXIAL PROJECTION

PP: Prone; MSP & OML perpendicular to IR; forehead & nose against the table; IR center 1 in. to nasion

RP: Nasion

CR: 25° cephalad

SS: Symmetric axial frontal image of petrous portions projected above the base of the skull

- IAM
- Labyrinths
- Mastoid antrums
- Middle ears
- Dorsum sellae & posterior clinoid processes w/in shadow of foramen magnum

ER: For patients who cannot assume AP axial position

VALDINI METHOD

PA AXIAL PROJECTION

PP: Recumbent or seated-erect (more comfortable); upper frontal region of skull against IR; MSP perpendicular to IR; head acutely flexed; IOML 50°/OML 50°; line extending frominion to 0.5 cm distal to nasion form 28° to CR

RP: 0.5 cm distal to nasion (dorsum sellae); foramen magnum at or slightly above level of EAM (petrosae)

CR: Perpendicular; inion (entrance); 0.5 cm distal to nasion (exit)

SS:

- DILA (IOML 50°): **D**orsum sellae; **I**nternal Auditory Meatus (IAM); **L**abyrinth

SKULL

- ETB “EaT Bulaga” (OML 50°): External auditory meatus; Tympanic cavity; Bony part of Eustachian tube

SCHULLER/PFEIFFER METHOD SUBMENTOVERTICAL (SUBBASAL) PROJECTION

PP: Supine or Seated-upright (more comfortable); OML parallel to IR or CR perpendicular to OML

(cannot fully extend the neck) or supraorbitomeatal line (SOML) parallel to IR; MSP perpendicular to IR; head rested on vertex; neck hyperextended

RP: ¾ in. anterior to EAM (sella turcica)

CR: Perpendicular to OML at midway b/n EAMs or 15-20° anteriorly at MSP of throat 1 in. anterior to EAMs

SS: Symmetric petrosae

- Mastoid processes
- Labyrinths
- EAMs
- Tympanic cavities
- Acoustic/auditory ossicles

Hirtz Method:

- **RP:** Midway b/n & 1 in. anterior to EAMs
- **CR:** 5° anteriorly

MAYER METHOD

AXIOLATERAL OBLIQUE PROJECTION

PP: Supine; auricles taped forward; outer side of IR elevated (reduces part-film distance); MSP 45° from IR; chin depressed; IOML parallel to IR

RP: Dependent EAM

CR: 45° caudad

SS: Axial oblique of petrosa

- Petrosa inferior to mastoid air cells
- EAM
- Tympanic cavity & ossicles
- Epitympanic recess (attic)
- Aditus

- Mastoid antrum

Owen Modifications: cited by Pendergrass, Schaeffer & Hodes

- **PP:** MSP 40° to IR; IR & head angled 10° caudally
- **CR:** 28° caudally

Owen Modifications: described by Etter & Cross

- **PP:** MSP 30° to IR
- **CR:** 25-30° caudally

Owen Modifications: described by Compere

- **PP:** MSP 30-45° to IR

- **CR:** 30° caudally

Owen Modifications: used by Zizmor

- **PP:** MSP 15° to IR
- **CR:** 35° caudally

STENVERS METHOD

POSTERIOR PROFILE POSITION

PP: Prone; forehead, nose & zygoma against IR (3-pt Upper Landing); IOML parallel to transverse axis of IR; face rotated away from side of interest; MSP 45° to IR

RP: 1 in. anterior to EAM closest to IR (exit)

CR: 12° cephalad

SS: Pars petrosa closest to IR

- Petrous ridge
- Cellular structure of mastoid process
- Mastoid antrum
- Area of tympanic cavity
- Labyrinth
- IAM
- Cellular structure of petrous apex

ARCELIN METHOD

ANTERIOR PROFILE POSITION

REVERSE STENVERS METHOD

PP: Supine; IOML perpendicular to IR; face rotated away from side of interest; MSP 45° to IR

SKULL

RP: 1 in. anterior & $\frac{3}{4}$ in. superior to EAM closest to IR (exit)

CR: 10° caudad

SS: Magnified pars petrosa away from IR

ER: Useful with children & with adults who cannot be position for Stenvers Method

MODIFIED LAW METHOD

AXIOLATERAL POSITION

Single Angulation Method

PP: Prone; taped auricle forward; Head rotated 15° toward IR; MSP 15°

RP: 2 in. posterior & 2 in. superior to uppermost EAM

CR: 15° caudad

SS:

- Mastoid cells
- Lateral portion of pars petrosa
- Superimposed IAM & EAM
- Mastoid emissary vessel (when present)

☺ THE END ☺

“BOARD EXAM is a matter of PREPARATION. If you FAIL to prepare, you PREPARE to fail”

04/01/14